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ABSTRACT

A study was made of a method to solve the problem of information transmission to teachers and administrators in local schools. The common feedback loop was analyzed, and information theory was applied to the problems of noise. To provide effective communication, the educational linking institution needs to meet three requirements. These requirements include: 1) the ability to access needs, 2) a knowledge of resources. Four models of communications linkage agents (Shannon, Ackoff, Havelock, and the Educational Information Consultant) describe the complexity of the task. As a result, the linking organization should be given adequate opportunity to prove itself before it becomes identified with extensive role descriptions. With adequate training, this role can be performed by many--from graduate students to mothers with teaching experience. In short, the prime and permanent linkage at the local level is an organization which is both local in control and flexible. Through projects, this organization (operating within systems analysis) effects innovation at appropriate levels of a local educational structure. (WCM)

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ESTABLISHING EFFECTIVE LINKAGES AT THE LOCAL EDUCATION AGENCY LEVEL

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In discussing verbal information transmission and linking at the level of the local education agency, it may be well to preface these remarks with a few basic theoretical considerations. The first model to which I would refer is Shannon's classification of the three levels of communication.[1] These levels are essentially as follows.

The technical level is the basic communication symbol transmission, such as the programming language of a computer. The second level, the semantic level, includes the interrelationship between groups of messages, such as a set of instructions, a pamphlet, a publication, etc. The third level is the level of effect, also called by some theorists, the pragmatic level. This level includes the values of the senders and receivers of the information in relation to the larger system, and in relation to the message content itself.

It seems quite clear that there is no dearth of technical, or even semantic, level messages and information being transmitted in education agencies today. Contemporary critics such as Silverman, or Postman and Weingartner, to mention a few, give ample credence to this premise. And even the skeptic will agree with that much of Toffler's projection in Future Shock that the amount of knowledge to be generated, thus transmitted, will increase in a spectacular amount during the next half-century.

It would seem to be a foregone conclusion that no individual, particularly no educator, would be capable of sorting through all the information and arrive at that effect or pragmatic level of choice, not to mention utilization. And at the level of local school, the efficiency of expecting, or even desiring, teachers to be conversant with all conceivably relevant information is, of course, out of the question.

The objective of this paper, then, is to describe one method for approaching a solution to the problem of information transmission in the schools. That is, I wish to present a considered schema for getting usable information to teachers and administrators in the local schools, information which is tied into the requirements for professional growth and educational experiences for the teacher and her clients, respectively.

Feedback Loop

We can begin with the common feedback loop concept. It seems necessary to establish a formal means for receiving evaluative information (feedback) from each local educator. This feedback concerns the adequacy of new (and old) information with which that person is to work. The classroom evaluation of the teacher by principals, etc., is the traditional formal means. (There are also numerous informal means at the disposal of principals, department chairmen, and the like.) Another, more recent, and perhaps more thorough device is that of the formal needs assessment. A structured instrument is administered and yields data related to professional and technical knowledge requirements as indicated by teacher or administrator himself.

The resulting data may be transformed into a priority listing for school district in-service courses, or guest lectures, or faculty meeting presentations. But, while the means for conveying such information may be one traditional to the district, there is another problem inherent in the transmission.

The Problem of Noise

Information theorists frequently contrast redundancy versus entropy in message transmission. Redundancy is the amount of predictability in the message. Thus, teachers' manuals, the principal's daily bulletin, faculty meetings, probably all rank high in terms of predictability. Entropy, on the other hand, is the amount of unpredictability in the message. And perhaps, we may posit that innovation of any sort tends to be high in unpredictability, especially to the degree that it deviates from normal practices.

The complication is found in the proposition that effective transmission of entropic (unpredictable) information mandates a considerably lesser amount of noise in transmission. Noise are those factors, external or internal to receiver of a message, which impede the steady transmission. The greater the amount of redundancy in the message, the greater the tolerance there is for noise.

Conversely, might we not conclude for the moment that the more unique or innovative (to the receiver) is the information, the less ordinary can the environment be while the information is being transmitted.

Let us look at an example.

A school superintendent is having difficulty coordinating the reporting of budgets from the various divisions within the system. The inability of the division heads to get their budgets to the central office on time prevents the superintendent from working up a total budget report until the "last minute." Division chiefs blame subordinates and so forth.

The Superintendent engages a consultant. The consultant decides the solution might be the development of a PERT chart by the staff. But, he insists that the personnel involved must move to a motel function room for a day so as to be away from the busy office routine (noise). The group devises a PERT chart. The message from consultant to staff was well received, though innovative and complex (unpredictable) because of a lack of "noise" in transmission. On a subsequent visit, the consultant met with staff in their offices. "Noise," this time was more tolerable since the message was more predictable.

By way of summary to this point, I am suggesting there must be a special way to link the specific needs of individual educators to the vast array of knowledge available today. We can learn the specific needs of teachers through formal assessment techniques; and, the more unique the information to be transmitted as need fulfillment, the more carefully treated must be the transmission channel for such information.

Linking Institutions

Professor Farr of Stanford notes the following in an ERIC paper.

> The linking institution of tomorrow is no longer a single individual, no longer a salesman with a commercial axe to grind, no longer a nonentity in the educational information flow system. Educational linkers are being called upon to shape the educational future of this country. Why? Because they are really the only ones in a position to do it. They are central to the flow of information, in touch with those who need to know and those who can tell them. A linking institution is not to be a passive midpoint in the flow of educational knowledge, but rather an active force in sending to, and seeking from all those who make up the educational community.[2]

There are three fundamental requirements that the linker must possess. These have been inferred in the writings of Havelock[3] and Lippitt[4] who are both located at the Center for Research on the Utilization of Scientific Knowledge (CRUSK) at the University of Michigan. First, the linker must be able to help the practitioner assess his needs. Before the practitioner can use information he must know specifically what his problems are. Second, he must have a knowledge of the resources which are available to solve the educational practitioner's problems. This will include not only the human resources of developers, consultants, and other practitioners but also printed resources in the form of research, successful practices, training programs, etc. Third, the linker must have access to these resources so that they can be made available to the practitioner. There may be nothing more frustrating to the practitioner than to know what his needs are, know what type of resources he needs, and then not be able to get them. These three requirements appear quite simple but as Havelock points out if the practitioner was able to perform all three of these activities himself he would not need a linker.[5]

There are several difficulties inherent in performing the knowledge linker role. These can be classified as follows:

1. Overload
2. Marginality

Overload can best be described as too much information to handle, too many people to get it from, too much processing to be done before it is useful, and too many people to give it to.[6] Marginality refers to the in-betweener position of the linker and the lack of precedence for the new role of "knowledge linker."

These two problems make it nearly impossible for an individual to fulfill the linker role. Farr states the following:

> What is obvious, however, is that educational linking cannot possibly be done by individuals alone but requires the resources and legitimacy of rather comprehensive organization.[7]

I submit that an organization in order to be effective in introducing change-oriented information must be cognizant of the noise levels in the client school; must be able to create new environments where noise levels will not interfere with transmission; and, must be able to simulate the ordinary environment of the client school.

To be an effective communication linkage at the local level, this institution must exhibit yet other characteristics. Of the many possible classifications and models that might be used to exemplify this, I have chosen four which possibly display the complexity of the task. All these characteristics are essential and can best be actualized in a collaborative of local educational agencies.

One classification for effective communication was previously alluded to. To Shannon's we can add Ackoff's for brief review.

Shannon: CHARACTERISTICS OF EFFECTIVE COMMUNICATION THEORY	Ackoff:[8] CHARACTERISTICS OF EFFECTIVE COMMUNICATION
Level A - The Technical Problem	1. INFORMING - changing the probabilities of choice
Level B - The Semantic Problem	2. INSTRUCTING - changing the efficiencies of course of action
Level C - The Effectiveness Problem	3. MOTIVATING - changing the values of outcomes

The first model is that of the Educational Information Consultant designed and produced by the Far West Laboratory for Educational Research and Development.[9] Briefly, their proposed training is focused on the following five processes.

NEGOTIATION: To identify, analyze, assess, and define specifically the problem and attendant information need(s) of a client.

RETRIEVAL:	To develop a search strategy and locate, identify, and secure R and D information pertinent to the client's problem and request.
TRANSFORMATION:	To screen, analyze and/or synthesize, and organize the results of the search in a form appropriate for delivery to the client.
COMMUNICATION:	To display and convey the results of the search to the client in a style appropriate for his use in finding a solution(s) to the problem.
EVALUATION:	To assess the performance of the major EIC processes and overall role and the operational effectiveness of the setting within the linkage system; reformulate based on evaluation and follow-up evidence; and make adjustments in processes and functions.

The final model is that of Ronald Havelock as proposed in his Guide To Innovation In Education.[10] The value of this lies in the fact that it represents the total purpose for which information is communicated and thus presents a more extensive schema. Havelock proposes six stages.

Stage I: RELATIONSHIP

The first thing the successful change agent needs to develop is a viable relationship with the client system or a solid base within it. A secure and reasonably well delineated helping role is an essential place from which to start. Some readers may be able to take this for granted because they already have a good client relationship, but others will find important points to consider from a reading of our first chapter.

Stage II: DIAGNOSIS

Once established in the client system, the change agent must turn to the problem at hand. He must find out if the client is aware of his own needs and if the client has been able to articulate his needs as problem statements. The second chapter discusses this topic from several angles.

Stage III: ACQUIRING RELEVANT RESOURCES

With a well defined problem, the client system needs to be able to identify and obtain resources relevant to solutions. The third chapter should give some good leads on how this information seeking can be carried out successfully.

Stage IV: CHOOSING THE SOLUTION

With a defined problem and a lot of relevant information, the client needs to be able to derive implications, generate a range of alternatives, and settle upon a potential solution. The fourth chapter discusses various aspects of this process.

Stage V: GAINING ACCEPTANCE

Even a good solution needs adaptation and needs to be reshaped to fit the special characteristics of the client. In the fifth chapter, we consider how initial acceptance of innovations can be generated and how the client may be able to develop attitudes and behavior supportive of the innovation.

Stage VI: STABLIZATION AND SELF-RENEWAL

Finally, the client needs to develop an internal capability to maintain the innovation and continue appropriate use without outside help. The change agent encourages members of the client system to be their own change agents and to begin to work on other problems in a similar way. As this self-renewal capacity begins to build, it allows the gradual termination of the relationship so that the change agent can move on to other projects, other problems, and other clients.

Although there is some reluctancy, when taken together these four schemata represent essential qualities which a collaborative of local educational agencies must exhibit if it is to perform its linking function. Before applying these, we must first grasp some of the specific characteristics of a local collaborative serving as a LINKING organization.

Shannon: CHARACTERISTICS OF EFFECTIVE COMMUNICATION THEORY	Ackoff: CHARACTERISTICS OF EFFECTIVE COMMUNICATION	EIC	HAVELOCK
Technical	Informing	Negotiation	Relationship
Semantic	Instructing	Retrieval	Diagnosis
Effective	Motivating	Transformation	Acquisition
		Communication	Choosing
		Evaluation	Acceptance
			Self Renewal

There are six functions which a successful local collaborative must perform. Briefly, these are:

1. THE ESTABLISHMENT OF RELATIONSHIP: This organization must be established within local political frameworks. Educational leaders must regard this as an organization containing high expertise but within their control. They must view it as a supplementary and cost effective service. Only after their fears are mitigated and trust obtained will they feel psychologically free to open their systems and move to higher levels of management problems and collaborate with others.

2. NEEDS ASSESSMENT: A collaborative will not be responsive (and as a result, not successful) if it fails to meet the needs of its subscribing members. On the other hand, these felt needs are often symptomatic. The task is to bring the client from his perceived need(s) to his real problem(s).

3. INFORMATION: Information systems and other printed materials comprise only a portion of the necessary resources. Research, human resources, local and national successful practices and training programs must be accessible to a linking institution in order for it to offer an option to its client.

4. BROKER: A collaborative must respond to the needs of its client with a product and/or process. Nevertheless, this must be accomplished through secondary temporary systems which do not threaten the identity of their parent organization. It is in this precise area that the collaborative performs its linking function -- linking the practitioner to appropriate information and resources. If it fails to deliver in this realm, it has failed.

5. FACILITATION: The art of implementation is most complex. It is this very point that is crucial to the effectiveness of the communication process. The acceptance, instruction and motivation of the client are crucial. Equally important are the multiple dimensions and levels the organization where the client finds himself. Unless all these facets are respected, the effectiveness of a proposed innovation will diminish.

6. EVALUATION: The collaborative must support this function in many ways. It should serve as a feedback loop to state and federal agencies as well as to the world of research. It must also assist its clients in monitoring their own innovative products and processes. Finally it must constantly monitor itself and the needs of its clients to maintain its own vitality.

The following summary matrix attempts to illustrate how the essential attributes of communication theory and a successful innovative process are incorporated into the six proposed functions for a collaborative linker of local educational organizations.

The institutionalization of this linker role in a local collaborative is not a panacea; however, it does provide the necessary support and coordination for its agents - an important concommitant which so far has not been alluded to in this paper. It is the organization that is the prime linker.

Extension or field agents (if there is any difference between the two) are secondary linkers. Nevertheless, the importance of these agents should not be underestimated. In order to effect the objectives of the organization, an informal communication process must be in constant operation.

	COLLABORATIVE ELEMENTS					
CONTRIBUTIONS OF KEY CONCEPTS	RELATIONSHIP	ASSESSMENT	INFORMATION	BROKER	FACILITATION	EVALUATION
Shannon: CHARACTERISTICS OF EFFECTIVE COMMUNICATION						
Technical			X			
Semantic				X		
Effective					X	
Ackoff: CHARACTERISTICS OF EFFECTIVE COMMUNICATION THEORY						
Informing				X		
Instructing					X	
Motivating					X	
EIC (Educational Information Consultant)						
Negotiation		X				
Retrieval			X			
Transformation				X		
Communication				X		
Evaluation						X
Havelock: MODEL FOR SUCCESSFUL INNOVATION						
Relationship	X					
Diagnosis		X				
Acquisition			X			
Choosing				X		
Acceptance					X	
Self Renewal						X

This interdependence of the two is so paramount that the neglect of one negates the effectiveness of the other. The organization as a support, resource, information and synchronizing system, and its agents initiate and sustain the relationship with its multiple clients. They also fulfill essential roles in the assessment, facilitation and evaluation functions this organization must perform.

At present, the definition or description of the extension agent's role is rather nebulous. Is it that of a project co-ordinator, organizational consultant, facilitator, or disseminator of information? The role of an information disseminator is quite different from that of the project director or consultant. The answer to this question very much affects the structure and operation of the parent organization. It also controls other variables such as:

1. the type of person desired
2. the training the agent requires
3. the salary the agent receives (and as a result)
4. the number of agents available

Their efforts must be synchronized with the objectives and constraints of their parent collaborative. As informal communication extensions of a linking organization, their task is to work with a large number of practitioners from different school systems in order to realize these objectives. This role is crucial, for if the objectives of a collaborative are not accepted at the grass roots level of a school district, it will fail to achieve its linking role.

The training required to prepare linking agents must include conceptual frameworks and specific skills. First, the individual must understand the framework of the knowledge utilization system and the types of processes that occur. The agent must also realize the inherent problems involved with the linker role and realize the need for a coordination of linker efforts to accomplish the task of bringing together practitioners and resources to meet the needs of the consumer. The individual must also develop diagnostic and facilitating

skills to assist the practitioner in assessing his needs. Such skills would include those of negotiation, retrieval, transformation, communication and evaluation as promoted in the Educational Information Consultant package of the Far West Lab.

The experiences of the agricultural extension agents have shown that it is not sufficient to merely train a man and send him out to fulfill his linking role. He must also be equipped with tools which enable him to function effectively as a linkage agent. Havelock suggests six types of tools which the agent should possess:

1. Linking strategies or project designs
2. Handbook of new practices, innovations, and usable research knowledge
3. Handbook on linking problems and solutions
4. Guide to the retrieval of knowledge
5. Simple instruments to measure the success of his dissemination and utilization efforts
6. Client self-diagnostic tools[11]

In my opinion, the task of the extension agent is to communicate appropriate and quality information to the multiple clients of the linking organization. In attempting to assist educators to renew themselves, his purpose is to discover their information needs and communicate appropriate responses.

This role of the information consultant as an extension agent for a linking organization should be given adequate opportunity to prove itself before this task becomes identified with more extensive role descriptions. In our experience, with adequate training, this role can be performed by many - from graduate students to mothers with teaching experience. Part time extension agents also prove most effective.

Again, the organization - local in control and flexible is the prime and permanent linkage at the local level. Through projects, this organization - operating within the framework of systems analysis - effects innovation at appropriate levels of a local educational structure, whether this be --

a. instructional systems

b. teachers

c. management

d. finance

e. policy

The extension agents, supported by this organization, support the individuals within these subsystems who are crucial to the success of any implementation and deepen the relationship between the organization and its clients.

FOOTNOTES

[1]Claude E. Shannon and Warren Weaver, The Mathematical Theory of Communication. (Urbana, Illinois: University of Illinois Press, 1949)

[2]Richard Farr, "Knowledge Linkers and the Flow of Educational Information,: in An Occasional Paper for ERIC at Stanford. (Stanford University: ERIC Clearinghouse on Educational Media and Technology, 1969), p. 7.

[3]Ronald Havelock, Planning for Innovation Through Dissemination and Utilization of Knowledge. (Ann Arbor, Michigan: Center for Research on Utilization of Scientific Knowledge (CRUSK), 1969) pp. 7: 1-7; 39.

[4]Ronald Lippitt, "The Use of Social Research to Improve Social Practice," in G. Watson (Ed.), Concepts for Social Change. (Washington, D. C.: NTL Institute for Applied Behavioral Science, 1967) pp. 71-80.

[5]Havelock, op. cit., p. 7:21.

[6]Ibid., p. 7:34.

[7]Farr, op. cit., p. 5.

[8]Russell Ackoff, "Towards A Behavioral Theory of Communication," in W. Buckley (Ed.) Modern Systems Research for the Behavioral Scientist. (Chicago: Aldine Publishing Co., 1968), p. 213.

[9]"The Educational Information Consultant: Skills in Disseminating Educational Information." A Project Report (Berkeley, Calif.: Far West Laboratory for Educational ment, July, 1971), pp. 7-10.

[10]Ronald Havelock, A Guide to Innovation in Education, (Ann Arbor, Michigan: Center for Research on Utilization of Scientific Knowledge - CRUSK - 1970), pp. 12-13.

[11]Ronald Havelock, Planning for Innovation through Dissemination and Utilization of Knowledge. op. cit., pp. 7:39 - 7:40.

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